

REMARKS

Reconsideration of the pending application is respectfully requested on the basis of the following particulars.

1. In the claims

As shown in the foregoing LIST OF CURRENT CLAIMS, the claims have been amended to more clearly point out the subject matter for which protection is sought.

Claim 1 is amended to clarify that an intermediate layer is formed by sequentially disposing a first intermediate cerium-based oxide layer and a second intermediate cerium-based oxide layer, different from the first intermediate cerium-based oxide layer, where the first intermediate cerium-based oxide layer includes cerium and a solid solution formation element and the second intermediate cerium-based oxide layer includes cerium and a charge compensation element. It is respectfully submitted that no new matter is added, since support for the amendments may be found, for example, at least on page 7, lines 12-25 and page 19, lines 5-15 of the accompanying description in the specification as originally filed.

Claims 2 and 3 are canceled.

Claims 4-7 and 9 are amended for clarity and to be consistent with amended claim 1.

Claims 8 and 10 are canceled.

Claim 12 is amended for clarity and to further clarify that a first intermediate cerium-based oxide layer is formed with a preliminary calcination, and a second intermediate cerium-based oxide layer is formed, and both the first and second intermediate cerium-based oxide layers are subject to the recited heat treatment to form a cerium based oxide intermediate layer including the first and second intermediate cerium-based oxide layers. It is respectfully submitted that no new matter is added, since support for the amendments may be found, for example, at least on page 7, lines 12-25 and page 19, lines 5-15 of the accompanying description in the specification as originally filed.

Claim 13 is amended to be consistent with amended claim 12.

Claims 14-17 are canceled.

Claim 18 is amended to be consistent with amended claim 12.

Claims 19-26 are canceled.

Claim 11 is left unchanged.

New claims 27 and 28 are added to recite the specific exemplary elements used as the solid solution and charge compensation elements. It is respectfully submitted that no new matter is added, since support for the amendments may be found, for example, at least on page 7, lines 12-25 and page 19, lines 5-15 of the accompanying description in the specification as originally filed.

Entry of the LIST OF CURRENT CLAIMS is respectfully requested in the next Office communication.

2. Rejection of claims 1-9, 11, 19-23, 25, and 26 under 35 U.S.C. § 103(a) as being unpatentable over U.S. patent no. 6,764,770 (*Paranthaman et al.*) in view of U.S. publication no. 2004/0157747 (*Chen et al.*)

This rejection is rendered moot with respect to claims 2, 3, 19-23, 25, and 26, by the cancelation thereof.

Reconsideration of this rejection is respectfully requested on the basis that the rejection fails to establish a *prima facie* case of obviousness with respect to amended claim 1, from which the remaining non-canceled claims depend.

By way of review, amended claim 1 requires, at least in part, an intermediate layer formed by sequentially disposing a first intermediate cerium-based oxide layer and a second intermediate cerium-based oxide layer, different from the first intermediate cerium-based oxide layer, where the first intermediate cerium-based oxide layer includes cerium and a solid solution formation element and the second intermediate cerium-based oxide layer includes cerium and a charge compensation element.

As discussed in detail in the specification, the formation of a first intermediate cerium-based oxide layer having a solid solution of Ce with a solid solution formation element prevents cracking of the cerium-oxide based layer and also lowers the melting point or crystallization temperature in a reaction treatment of crystallization (specification page 11, lines 22-24; page 13, lines 10-15).

The second intermediate cerium-based oxide layer having a charge compensation element that compensates for a charge mismatch between the respective ions of Ce and the solid solution formation element inhibits ion diffusion in the oxide film (specification page 13, lines 18-23).

For clarification, while the cerium, solid solution formation element, and the charge compensation element recited in the claims are in ionic state during the coating of the metal substrate, after the combination of the cerium with the solid solution formation element and the charge compensation element, the charges are balanced, and the elements are no longer in the ionic state.

As discussed in detail in a previous response, and as acknowledged in the Office action dated June 16, 2009, on page 3, the *Paranthaman* patent does not disclose in the intermediate buffer layer cerium paired with either a solid solution formation element or a charge compensation element.

In particular, the *Paranthaman* patent does not disclose an intermediate layer formed by sequentially disposing a first intermediate cerium-based oxide layer and a second intermediate cerium-based oxide layer, different from the first intermediate cerium-based oxide layer, where the first intermediate cerium-based oxide layer includes cerium and a solid solution formation element and the second intermediate cerium-based oxide layer includes cerium and a charge compensation element, as required by amended claim 1.

Specifically, the *Paranthaman* patent only discloses a cerium oxide (CeO_2) layer, with no additional elements (Fig. 1b), or a CeMnO_3 layer (Figs. 9-14; col. 8, lines 60-63), but does not disclose a first intermediate cerium-based oxide layer including cerium and a solid solution formation element and a second intermediate

cerium-based oxide layer including cerium and a charge compensation element, as required by amended claim 1.

The Office action turns to the *Chen* publication in an attempt to cure this deficiency of the *Paranthaman* patent.

However, as indicated on pages 3-4 of the Office action dated June 16, 2009, and as discussed in paragraph [0036] and claims 7 and 8 of the *Chen* publication, the buffer layer of the *Chen* publication includes cerium oxide doped with group 2, IIA or 2A metal oxides, transition element oxides, lanthanide metal oxides, actinide metal oxides, or mixtures thereof.

The *Chen* publication has no disclosure of a first intermediate cerium-based oxide layer including cerium and a solid solution formation element and a second intermediate cerium-based oxide layer including cerium and a charge compensation element, as required by amended claim 1.

Thus, even if the cerium oxide doped with group 2, IIA or 2A metal oxides, transition element oxides, lanthanide metal oxides, actinide metal oxides, or mixtures thereof of the *Chen* publication are added to the cerium oxide layer of the *Paranthaman* patent, the proposed combination thereof still fails to disclose a first intermediate cerium-based oxide layer including cerium and a solid solution formation element and a second intermediate cerium-based oxide layer including cerium and a charge compensation element, as required by amended claim 1.

Accordingly, a *prima facie* case of obviousness cannot be established with respect to amended claim 1, and withdrawal of this rejection is respectfully requested.

As mentioned above, applicants submit that independent claim 1 is patentable and therefore, claims 4-7, 9, and 11 which depend from claim 1, are also considered to be patentable as containing all of the elements of claim 1, as well as for their respective recited features.

3. Rejection of claims 10 and 24 under 35 U.S.C. § 103(a) as being unpatentable over U.S. patent no. 6,764,770 (*Paranthaman et al.*) in view of U.S. publication no. 2004/0157747 (*Chen et al.*) and further in view of U.S. patent no. 4,959,348 (*Higashibata et al.*)

This rejection is rendered moot by the cancellation of claims 10 and 24.

Accordingly, withdrawal of this rejection is respectfully requested.

4. Rejection of claims 12-18 under 35 U.S.C. § 103(a) as being unpatentable over U.S. patent no. 6,764,770 (*Paranthaman et al.*) in view of U.S. publication no. 2004/0157747 (*Chen et al.*) and further in view of U.S. patent no. 5,444,040 (*Kojima et al.*)

Reconsideration of this rejection is respectfully requested on the basis that the rejection fails to establish a *prima facie* case of obviousness with respect to amended claim 12, from which the remaining non-canceled claims depend.

The deficiencies of the *Paranthaman* patent and the *Chen* publication are discussed above in detail with respect to amended claim 1. Amended claim 12 requires the same features as amended claim 1, and additionally requires applying the recited mixed solution on a surface of a metal substrate and preliminarily calcining the same to form the first cerium-based oxide intermediate layer, and next applying the recited mixed solution on top of the first cerium-based oxide intermediate layer to form a second cerium-based oxide intermediate layer and then applying the recited heat treatment in order to form a cerium-based oxide intermediate layer including the first and second cerium-based intermediate layers.

As discussed above, the *Paranthaman* patent and the *Chen* publication fail to disclose cerium paired with either a solid solution formation element or a charge compensation element, and thus fail to disclose a method of forming the cerium-based oxide intermediate layer including the first and second cerium-based intermediate layers, as required by amended claim 12.

Further, amended claim 12 requires a preliminary calcination of the first cerium-based intermediate layer, and the subsequent heat treatment to form the

cerium-based oxide intermediate layer including the first and second cerium-based intermediate layers.

Turning to the *Kojima* patent, there is no disclosure of a first intermediate cerium-based oxide layer including cerium and a solid solution formation element and a second intermediate cerium-based oxide layer including cerium and a charge compensation element.

Further, while the *Kojima* patent discloses in claim 1 preliminarily calcining a material at 800 °C to 950 °C, and further sintering a rod at 1000 °C to 1200 °C, there is simply no disclosure or suggestion in the *Kojima* patent to apply a mixed solution on a surface of a metal substrate and preliminarily calcining the same to form a first cerium-based oxide intermediate layer, and next applying a mixed solution on top of the first cerium-based oxide intermediate layer to form a second cerium-based oxide intermediate layer and then applying heat treatment in order to form a cerium-based oxide intermediate layer including the first and second cerium-based intermediate layers, as is required by amended claim 12.

Accordingly, the proposed combination of the *Paranthaman* patent, the *Chen* publication, and the *Kojima* patent cannot establish a *prima facie* case of obviousness with respect to amended claim 12, from which the remaining non-canceled claims 13 and 18 depend. Therefore, withdrawal of this rejection is respectfully requested.

5. New claims

Applicants submit that new claims 27 and 28, which depend from amended claims 1 and 12 respectively, are considered to be patentable as containing all of the elements of respective claims 1 and 12, as well as for their respective recited features. In particular, none of the cited prior art documents disclose that the solid solution formation element is Gd and the charge compensation element is Nb, as is required by new claims 27 and 28.

6. Conclusion

As a result of the amendment to the claims, and further in view of the foregoing remarks, it is respectfully submitted that the application is in condition for allowance. Accordingly, it is respectfully requested that every pending claim in the present application be allowed and the application be passed to issue.

Please charge any additional fees required or credit any overpayments in connection with this paper to Deposit Account No. 02-0200.

If any issues remain that may be resolved by a telephone or facsimile communication with the applicants' attorney, the examiner is invited to contact the undersigned at the numbers shown below.

BACON & THOMAS, PLLC
625 Slaters Lane, Fourth Floor
Alexandria, Virginia 22314-1176
Phone: (703) 683-0500
Facsimile: (703) 683-1080

Date: January 19, 2010

Respectfully submitted,

/Patrick M. Buechner/

PATRICK M. BUECHNER
Registration No. 57,504
for
GEORGE A. LOUD
Attorney for Applicants
Registration No. 25,814